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वस्त्रादि — छाते के लिये बुने हुये नॉईलान  
का कपड़ा, जलरोधी — विशिष्टि  
( पहला पुनरीक्षण )

**Textiles — Woven Nylon Fabric for  
Umbrellas, Water Resistant —  
Specification**  
( *First Revision* )

ICS 59.080.30

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## FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Man-Made Fibres, Cotton and their Products Sectional Committee had been approved by the Textiles Division Council.

Dyed or printed nylon fabric is nowadays very commonly used for various types of umbrellas especially for folding type, mainly because of its durability, crease resistance, attractive appearance and hydrophobicity. The range of different types of nylon fabrics used for umbrellas is very wide and thus formulation of a standard for their performance requirements so as to have their optimum end use suitability needs no emphasis.

This standard was originally published in 1986 and has been revised to incorporate the following changes:

- a) BIS certification marking clause has been modified.
- b) References to Indian Standards have been updated.
- c) Sampling plan has been modified.

The composition of the Committee responsible for the formulation of this standard is given in Annex G.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

**TEXTILES — WOVEN NYLON FABRIC FOR  
UMBRELLAS, WATER RESISTANT — SPECIFICATION**  
( *First Revision* )

**1 SCOPE**

This standard prescribes the performance requirements of different kinds of water resistant, woven, nylon fabrics used for various types of umbrellas.

**2 REFERENCES**

**2.1** The standards listed in Annex A contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

**3 MANUFACTURE AND FINISH**

**3.1 Yarn** — High tenacity continuous filament yarn of nylon 6 or nylon 6 6 shall be used in the manufacture of umbrella cloth. It shall have nominal spinner's twist only, unless otherwise required specifically in the manufacture. The melting point of yarn used in the manufacture of the fabric shall not be less than 244°C in case of nylon 6.6 and 210°C in case of nylon 6.

NOTE — The tenacity of the yarn may be stated in the contract or the order if so desired by the purchaser.

**3.2 Basic Fabric** — The basic nylon fabric shall be evenly and uniformly woven in plain weave and shall be of such a quality that knots of yarn,

unevenness of count and twist, and other spinning and weaving defects likely to affect the appearance or serviceability of the finished fabric are not noticeable (*see also 4.5*). Unless otherwise specified, the fabric shall be heat set.

**3.3 Finish** — The basic nylon fabric shall be rendered water resistant either by treating with silicon polymer or by coating with a suitable natural or synthetic rubber compound so that it meets the requirement as specified from **4.1** to **4.9** and in Table 1. In case of coated fabrics, coating shall be smooth, pliable and free from tackiness, stains, spots or other manufacturing defects (*see also 4.5*). The coating shall not have any objectionable odour.

**3.3.1** If the fabric is treated with silicone polymer, manufacture shall give a certificate that the fabric has been rendered water resistant by treating with silicone polymer. For coated fabric, the manufacturer shall specify the composition of natural or synthetic rubber compound used for coating.

**4 PERFORMANCE REQUIREMENTS**

**4.0** The nylon fabric used for umbrellas, shall conform to the performance requirements given in Table 1 in addition to the requirements specified from **4.1** to **4.9** wherever applicable.

NOTE — The constructional requirements of some of the woven nylon fabrics are given in Table 2 for guidance only. Fabrics of other constructions may also be used provided they meet all the requirements specified in this standard.

**Table 1 Requirements of Nylon Fabrics for Umbrellas**  
(Clauses 3.3 and 4.0)

Sl No.	Characteristic	Requirement	Method of Test
(1)	(2)	(3)	(4)
i)	Colour fastness to light (Dyed fabrics only) ( <i>see</i> Note 1)	5 or better	IS/ISO 105-B01 or IS/ISO 105-B02
ii)	Colour fastness to washing (Dyed fabrics only)		IS/ISO 105-C10 [Test Number A (1)]
	a) Change in colour	4 or better	
	b) Staining to adjacent fabrics	4 or better	
iii)	Colour fastness to vulcanizing With hot air, change in colour (Coated fabrics only)	5 or better	IS/ISO 105-S01
iv)	Water solubles, percent, <i>Max</i>	2.0	IS 3456
v)	pH value	6.0 to 8.0	IS 1390 (Cold method)
vi)	Shrinkage or elongation, percent, <i>Max</i>		IS 2977
	i) Warp	2.0	
	ii) Weft	2.0	
vii)	Mass of the coating material (for coated fabrics only), percentage of the bone dry mass of the basic fabric, <i>Max</i>	50	Annex E
viii)	Uniformity of coating, variation of mass of coating material, Percent (for coated fabrics only)	± 3	Annex E
ix)	Solid content of coating material, percent, <i>Min</i> (for coated fabrics only)	80	Annex F
x)	Mass of the silicone polymer applied (for silicone treated fabrics), Percent of silicone bone dry mass of basic fabric	0.3 to 0.5	Certificate of compliance to this effect shall be given by the manufacturer or supplier.

**Table 1 (Contd.)**  
(Clauses 3.3 and 4.0)

Sl No.	Characteristic	Requirement	Method of Test
(1)	(2)	(3)	(4)
xi)	Water resistance		
	a) Static pressure head test at 150 mm water pressure head	Water does not leak through the fabric	IS 7940
	b) Cone test	No leakage	IS 7941
xii)	Mass per unit area of the unfinished fabric, g/m <sup>2</sup> , <i>Min</i>	50	IS 1964
xiii)	Breaking strength, N, <i>Min</i>		IS 1969 (Part 1)
	i) Warp direction	590	
	ii) Weft direction	590	
xiv)	Tearing strength, N, <i>Min</i>		IS 6489
	i) Warp direction	17.2	
	ii) Weft direction	17.2	
xv)	Bursting strength (Diaphragm method), N, <i>Min</i>	590	IS 1966

NOTE — In case of dispute, the colour fastness to light shall be determined by the method prescribed in IS/ISO 105-B01.

#### 4.1 Dyeing or Printing

**4.1.1** If the fabric is to be dyed or printed, it shall be done before finishing.

**4.1.2** Dyes known to accelerate actinic damage shall not be used.

#### NOTES

**1** The following are the Colour Index (C. I.) number of some of the dyestuffs that are known to accelerate actinic damage to nylon 6.6.

Acid red 211  
Mordant blue 49  
Disperse black 1

**2** The following are the Colour Index (C. I.) numbers of some of the dyestuffs that, either alone or mixed together, are known to have protective effect on nylon 6.6.

Acid black 132  
Acid green 43  
Disperse yellow 3  
Disperse orange 3  
Mordant yellow 34

Table 2 Constructional Particulars of Basic Nylon Fabric

(Note under 4.0)

Sl No.	Approximate Linear Density of Yarn, denier		Ends per dm	Picks per dm	Mass g/m <sup>2</sup>
			<div>Warp</div>	<div>Weft</div>	
(1)	(2)	(3)	(4)	(5)	(6)
i)	100	100	210	210	50
ii)	40	40	680	480	55
iii)	20	40	960	380	60
iv)	81	81	400	360	70
v)	210	210	160	160	70
vi)	81	81	560	520	100
vii)	210	210	210	190	100
viii)	210	210	240	230	120
ix)	81	81	800	500	125
x)	420	420	130	130	135
xi)	840	840	90	80	175
xii)	840	840	105	95	200
xiii)	840	840	120	130	250
Method of Test	—	—	← IS 1963 →		IS 1964

**4.1.3** The fastness of colour to artificial light and the fastness of colour to water in respect of the change of colour and staining of adjacent fabrics shall be as given in Table 1.

**4.1.3.1** In case of fabrics coated with suitable natural or synthetic rubber compounds, the colour fastness to vulcanising with hot air of the coated nylon fabric shall be as given in Table 1, in addition to the colour fastness to water and artificial light.

**4.2 Weft Skew and Bow** — Weft deviation from a line drawn perpendicular to the selvage shall not exceed 25 mm per metre width of fabric.

**4.3 Warp Bow** — Warp bow shall not exceed 20 mm per 10 metres length of fabric.

**4.4 Weave** — The fabric shall be woven in plain or 2/2 matt weave evenly and uniformly. The edges shall be straight, even and well-made and shall not be substantially thicker than the body of the fabric.

#### **4.5 Freedom from Defects and Their Acceptance Limit**

**4.5.1** The various defects which may occur in the basic woven fabric or coated fabric are given in Annex B.

**4.5.2** The length per 100 m nominal length of basic woven fabric affected by the defects shall not exceed the following:

a) Defects hindering fabrication and defects of lay and finish: 5 m.

NOTE — Such fabric can sometimes be made acceptable by suitably re-finishing.

b) Serious defects : 10 m.

c) Gross defects : nil.

**4.5.2.1** A lot shall be acceptable only if the total quantity affected by these defects does not exceed 5 percent.

**4.5.3** The length per 100 m nominal length affected by defects in case of coated fabrics shall not exceed 10 m. The length affected by defects shall be marked at the end of each piece of coated fabric.

NOTE — 1 m of coated fabric is deemed to be affected by the presence of one defect or a group of defects within one metre.

**4.6 Length and Width** — The minimum width of fabric shall be either 53.3 cm or 54.5 cm or 61.0 cm (*see* Note). The length of the pieces of fabric shall be as agreed to between the buyer and the seller but it shall not be less than 25.5 metres.

NOTE — 61.0 cm width should be used for umbrella cloth for men; 54.6 cm width for umbrella cloth for men to be used for folding type umbrellas; and 53.3 cm width for umbrella cloth for women.

**4.7 Resistance to Ageing** — The fabric shall be aged at  $70 \pm 2^\circ\text{C}$  for 168 hours in an air oven as prescribed in Annex C. The average breaking strength of the aged fabric shall not be less than 90 percent of the average original breaking strength. After the fabric has been aged, there shall be no cracks, softening or signs of brittleness.

**4.8 Resistance to High Temperature** — The coating on an exposure of 24 hours to a

temperature of  $100 \pm 2$  percent shall not show any sign of exudation or stickiness.

**4.9 Flexibility** — The flexibility of the coated fabric shall be such that the average overhang is not greater than 10 cm in both the warp and weft directions when tested by the method prescribed in Annex D.

## 5 SEALED SAMPLE

**5.1** If, in order to illustrate or specify the general appearance, feel, shade and finish, etc, of cloth, a sample has been agreed upon and sealed, the supply shall be in conformity with the sample in such respects.

**5.1.1** The custody of the sealed sample shall be a matter of prior agreement between the buyer and the seller.

## 6 MARKING

**6.1** Each roll of fabric shall be marked with the following:

- a) Name of the material;
- b) Mass per unit area of the basic fabric;
- c) Manufacturer's name, trade-mark, etc, if any;
- d) Month and year of manufacture; and
- e) Length and width of each roll.

### 6.1.1 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

**6.2** The marking shall be legible and permanent and on a durable label which shall be securely attached to each separate length of package.

## 7 PACKING

**7.1** The fabric shall be packed in roll form as specified in IS 2194 or IS 2195.

## 8 DECLARATION AND TOLERANCE

**8.1** The manufacturer shall declare the constructional particulars, namely, count of warp and weft yarns, number of ends and picks per decimetre, mass ( g/m<sup>2</sup>) length and width of fabric in a lot.

**8.2** The tolerance as given below shall be permitted on the constructional particulars:

- i) Nominal count of warp and weft yarn, in tex  
± 5 percent
- ii) Ends/dm and picks/dm  
± 5 percent
- iii) Mass (g/m<sup>2</sup>)  
+ 5 percent  
– 2.5

iv) Length

+ 5 percent

– 0

## 9 SAMPLING AND CRITERIA FOR CONFORMCTY

**9.1** The lot shall consist of all the water resistant woven nylon fabric delivered to a buyer against one despatch note.

**9.2** Unless otherwise sampling plan is specified in the contract or order, the sampling plan as given in Table 3 may be used for inspecting and testing of nylon fabrics against this standard. The number of rolls to be selected from the lot for assessing ends, picks, width, mass and weft skew and bow and warp bow (*see 4.3 and 4.4*) shall be as per col 2 of Table 3. The number of test specimens to be selected for other tests shall be in accordance with col 4 of Table 3. To ensure the randomness of selection, IS 4905 may be followed.

**Table 3 Sampling Plan for Nylon Fabrics for Umbrellas**  
(Clause 9.2)

Sl	Lot Size	Sample Size	Permissible No. of Defectives Samples	Sub-Sample Size (to be drawn from sample)	Permissible No. of Defectives Sub-Samples
(1)	(2)	(3)	(4)	(5)	(6)
i)	2 to 25	3	0	3	0
ii)	26 to 90	13	1	3	0
iii)	91 to 150	20	2	13	1
iv)	151 to 280	32	3	13	1
v)	281 to 500	50	5	20	1
vi)	501 to 1 200	80	7	32	2
vii)	1 201 and above	125	10	50	3

NOTE – If sample size equals or exceeds lot size, carry out 100 percent inspection.



### **8.3 Criteria for Conformity**

The lot shall be declared conforming to the requirements of this standard if the total number

of defective samples does not exceed the permissible numbers given in col 3 or col 5 of Table 3 as applicable.

**ANNEX A**  
(Clause 2.1)

**LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
1390:2022	Textiles — Determination of pH of aqueous extract ( <i>third revision</i> )	6489 (Part 1): 2011	Textiles — Tear properties of fabrics Part 1 Determination of tear force using ballistic pendulum method (Elmendorf) ( <i>second revision</i> )
1964:2001	Textiles—Methods for determination of mass per unit length and mass per unit area of fabrics ( <i>second revision</i> )	7940:1976	Method for determining resistance to penetration by water of fabrics by static pressure head test
1966 (Part 1): 2009	Textiles — Bursting properties of fabrics Determination of bursting strength and bursting distension Part 1 Hydraulic method ( <i>second revision</i> )	7941:1976	Method for determining the water repellency of fabrics by cone test
IS 1969 (Part 1):2018	Textiles — Tensile properties of fabrics – Part 1 Determination of maximum force and elongation at maximum force using the strip method ( <i>fourth revision</i> )	IS/ISO 105-B01:2014	Textiles — Tests for colour fastness — Part B01 Colour fastness to light: Daylight
2977:1989	Fabrics (other than wool) — Method for determination of dimensional changes on soaking in water ( <i>first revision</i> )	IS/ISO 105-B02:2014	Textiles — Tests for colour fastness — Part B02 Colour fastness to artificial light: Xenon arc fading lamp test
3456:2022	Method for determination of water soluble matter of textile materials ( <i>first revision</i> )	IS/ISO 105-C10:2006	Textiles — Tests for colour fastness Part C10 Colour fastness to washing with soap or soap and soda
4905 : 2015	Random sampling and randomization procedures ( <i>first revision</i> )	IS/ISO 105-S01 : 1993	Textiles — Tests for Colour Fastness Part S01 Colour Fastness to Vulcanization: Hot Air

**ANNEX B**  
(Clause 4.5.1)

**FABRIC DEFECTS AND METHODS OF MARKING**

**B-1 CLASSIFICATION OF DEFECTS**

**B-1.1 Woven Fabrics**

**B-1.1.1 Minor Defects** — Defects visible and liable to lead to queries, but unless very frequent, not justifying special attention or penalty.

**B-1.1.2 Defects Hindering Fabrication** — Defects implying some inconvenience in subsequent fabrication and so justifying temporary marking.

- a) Width deviation - Outside the limit specified in this standard.
- b) Bowed or skewed weft — Outside the limit specified in this standard.
- c) Incorrect selvedge lay — Any part slack, wavy or tight.

**B-1.1.3 Defects of Lay and Finish Hindering Subsequent Coating** — Defects resulting in any portion of fabric showing departure from flat lay:

- a) Creases,
- b) Furrows,
- c) Longitudinal bars of relatively tight or slack warp threads, and
- d) Tight or slack selvedges.

**B-1.1.4 Serious Defects** — Defects affecting performance and requiring cutting out by the buyer:

a) Broken threads

- i) In fabrics with a total of 40 or less threads (warp plus weft) per centimetre: a single broken thread.
- ii) In fabric with a total of more than 40 but not more than 80 threads (warp

plus weft) per centimetre: two or more adjacent or alternate broken threads or a single thread broken for more than 75 mm.

- iii) In fabrics with a total of more than 80 threads (warp plus weft) per centimetre: two or more adjacent or alternate broken threads, except in fabrics for coating when up to four ends broken or three ends broken for not more than 75 mm are classed as minor defects provided that the fabrics has been carefully combed and dressed at thin place.

b) Mechanical injuries, holes, cuts, tears, damage by temples taken on rollers, pin stanter, etc, judged in extent as in (a) above.

c) Loose threads, loops or groups of minor floats if not neatly trimmed off or if, after trimming, broken threads occur as in (a) above.

d) Floats over 6.5 mm square or, if over 13 mm long or broad, floating over more than four threads.

e) Hard inclusions.

f) In fabric for coating only, soft inclusions such as slubs, fur and sloughed weft, liable to protrude through coating films which are often about 0.1 mm thick.

NOTE — Soft inclusions are not regarded as harmful in fabrics not intended for coating.

g) Badly made pull backs.

h) Bad starting places if so thin that a 25 mm length of fabric, including the starting places, has pick count more than 10 percent below normal or if having a ribbed or poplin appearance extending from selvedge to selvedge.

j) Stains, unless the causes are known and the effects are known to be harmless.

**B-1.1.5 Gross Defects (Fabrics for Coating Only)** — Defects preventing coating and requiring removal by cutting out the defective areas across the full fabric width and making a butt seam (overlap seam are not acceptable):

- a) Bad smashes,
- b) Holes larger than 6 mm square,
- c) Very large floats,
- d) Missing weft across full width for more than 6 mm, and
- e) Mechanical damage of similar magnitude.

#### **B-1.2 Coated Fabrics**

- a) *Mechanical Damage* — Holes, cut or mechanical injuries to the coating of fabric.
- b) *Serious Defects* — See **B-1.1.4**.

c) *Thin Coating* — Any area where coating is absent or visibly thinner than the bulk, including areas thinned by straightening of crimps or creases.

d) *Rough Coating* — Any area having markedly pitted coating or surface gritty to touch.

e) *Inclusions* — Any part containing extraneous matter, i.e. other than the coating compound.

f) *Joints* — Any part that contains a joint other than a specified bias joint.

g) *Bias Joints* — Any part of a bias joint that contains blisters, is lifted at the edge or is less than 10 mm wide.

h) *Stains* — Any stain due to contamination by metals, acids or alkalis.

#### **B-1.3 Method of Marking**

**B-1.3.1** Each defect shall be marked by ringing or outlining its extent on the surface in a marking medium of contrasting colour which shall be free from ingredients harmful to the coated fabric.

NOTE — The marks should preferably be on the same side of the fabric as the specified identification marking; the choice of side may be as agreed to between the buyer and the seller.

**ANNEX C***(Clause 4.7)***DETERMINATION OF EFFECT OF AGEING****C-1 APPARATUS**

**C-1.1** An oven maintained at a temperature of  $70 \pm 2^\circ\text{C}$ .

**C-2 PREPARATION OF TEST SPECIMENS**

**C-2.1** From the test sample, cut at least two specimen each at least 75 mm Square.

**C-3 PROCEDURE**

**C-3.1** Suspend the specimen in the oven, one freely and the other over water in a loosely closed vessel at  $70 \pm 2^\circ\text{C}$  temperature.

**C-3.2** After 7 days remove the specimens from the oven and allow them to stand at room temperature for 15 min.

**C-3.3** Subject each specimen to the following treatments:

- a) Fold consecutively in two directions parallel to the edges and at right angles to each other, so as to reduce the exposed area to one quarter of its original value, pressing each fold by rubbing the fingers and thumb along it;
- b) Unfold;
- c) Fold again as in (a) along the same creases, but with each fold reversed in direction.

**C-3.4** Inspect the specimens for cracks, softening or stickiness and signs of brittleness.

**ANNEX D**

*(Clause 4.9)*

**DETERMINATION OF FLEXIBILITY OF COATED FABRICS**

**D-1 PREPARATION OF SPECIMENS**

**D-1.1** Cut from the test sample six rectangular specimens, each 250 mm by 25 mm, three each with the longer side closely parallel to the warp and weft thread directions.

**D-2 PROCEDURE**

**D-2.1** Lay a specimen on a smooth horizontal surface terminated at one end by a straight edge, so that the length of the specimen is at right angle to, and one end is level with that edge.

**D-2.2** Move the specimen lengthwise over the edge at a uniform rate of approximately 25 mm in

5 seconds, until the over-hanging end is 30°C below the horizontal.

**D-2.3** Measure the length of the fabric protruding beyond the edge.

**D-2.4** Repeat the procedure given in **D-2.1** to **D-2.3** with the other face of the same end of the same specimen uppermost.

**D-2.5** Test the other five specimens as described in **D-2.1** to **D-2.4**.

**D-2.6** Report the average of the six measurements for the specimens cut in the warp directions and the average of the six measurements cut in the weft direction.

## ANNEX E

(Table 1)

## DETERMINATION OF MASS OF COATING MATERIAL AND UNIFORMITY OF COATING

## E-1 PREPARATION OF SPECIMENS

**E-1.1** Cut out at least two rectangular specimens of  $400 \pm 0.5$  mm x  $100 \pm 0.5$  mm size from each piece as selected in 8.3 from different parts along the length of the piece. Each specimen shall have different set of warp threads.

## E-2 PROCEDURE

**E-2.1** Weigh all the test specimens as in **E-1**, nearest to 1 mg and find out the difference between the minimum and maximum mass of the specimens. This indicates the variation of mass of coating.

**E-2.2** Report the difference between the minimum and maximum mass of the specimens as an indication of the uniformity of coating.

**E-2.3** Find out the average mass of the specimens from the values as obtained in **E-2.2**.

**E-2.4** Similarly cut out at least two rectangular specimens of  $400 \pm 0.5$  mm x  $100 \pm 0.5$  mm from each piece of the basic fabric. Select at least three such pieces and make at least six specimens.

**E-2.5** Weigh each specimen as obtained in **E-2.4** nearest to 1 mg and find the average of all the values.

**E-2.6** Calculate the average mass of the coating material per square metre by the formula:

$$m = \frac{m_1 - m_2}{m_2} \times 25$$

where

$m$  = average mass of coating material in g/m<sup>2</sup>,

$m_1$  - average mass of the coated specimens as obtained in **E-2.3**, in g and

$m_2$  - average mass of the specimens of basic fabric as obtained in **E-2.5**, in g.

## ANNEX F

(Table 1)

### DETERMINATION OF TOTAL SOLID CONTENT OF COATING MATERIAL

#### F-1 APPARATUS

##### F-1.1 Evaporating Dish

**F-1.2 Air Drying Oven** — capable of Being Maintained at  $105 \pm 3^\circ\text{C}$

##### F-1.3 Desiccator

**F-1.4 Weighing Balance** — with an Accuracy Up to 1 mg

#### F-2 PROCEDURE

**F-2.1** Weigh exactly about 10 g of the coating material in a tared evaporating dish.

**F-2.2** Keep the tared evaporating dish with cover along with the coating material in it, in a desiccator.

**F-2.3** Keep the desiccator and its contents in an air drying oven maintained at  $105 \pm 3^\circ\text{C}$  for about 4 hours till all water is evaporated and consecutive weighings of residue in evaporating dish after cooling give constant reading.

**F-2.4** Find out the constant mass of the cooled residue, by subtracting from the mass of dish and residue the mass of empty dish.

**F-2.5** Calculate the total solid content, percent by the following formula:

$$S, \text{ percent} = \frac{a - b}{a} \times 100$$

where

$a$  = mass of the coating material as obtained in **F-2.1**, and

$b$  = mass of the residue of the coating material as obtained in **F-2.4**.



**ANNEX G***(Foreword)***COMMITTEE COMPOSITION**

Man-Made Fibers, Cotton and their Products Sectional Committee,  
TXD 31

<i>Organization</i>	<i>Representative(s)</i>
ICAR – Central Institute for Research on Cotton Technology, Mumbai	DR P. K. MANDHYAN ( <i>Chairman</i> )
Ahmedabad Textile Industry's Research Association, Ahmedabad	SHRIMATI DEEPALI PLAWAT SHRI JIGAR DAVE ( <i>Alternate</i> )
Association of Synthetic Fibre Industries, New Delhi	SHRI M. S. VERMA
AYM Syntex Ltd, Dadra and Nagar Haveli	SHRI ARNAB SAMANTHA SHRI SAUGATA DAS ( <i>Alternate</i> )
Confederation of Indian Textile Industry, New Delhi	SHRI D. K. NAIR SHRI SHAJU MANGALAM ( <i>Alternate</i> )
Consumer Guidance Society of India, Mumbai	DR SITARAM DIXIT DR M. S. KAMATH ( <i>Alternate</i> )
Cotton Association of India, Mumbai	SECRETARY
Defence Materials and Stores Research and Development Establishment, Kanpur	SHRI ASHOK KUMAR YADAV SHRI BISWA RANJAN DAS ( <i>Alternate</i> )
Grasim Industries Limited, Vadodara	SHRI AJAY SARDANA DR ROHITASVA KUMAR ( <i>Alternate</i> )
ICAR – Central Institute for Research on Cotton Technology, Mumbai	DR SENTHIL KUMAR DR A ARPUTHARAJ ( <i>Alternate</i> )
JCT Limited, Phagwara	SHRI KHUSHWINDER SINGH DHILLON SHRI ARWINDER SINGH ( <i>Alternate</i> )
North India Textile Mills Association, Chandigarh	SHRI SANJAY GARG SHRI SIDHARTHA KHANNA ( <i>Alternate</i> )
Northern India Textile Research Association, Ghaziabad	SHRI SANJEEV SHUKLA SHRIMATI NEHA KAPIL ( <i>Alternate</i> )
Office of Textile Commissioner, Mumbai	SHRI SOURABH KULKARNI SHRI PRANAV PARASHAR ( <i>Alternate</i> )

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<i>Organization</i>	<i>Representative(s)</i>
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